

Practitioner's Docket No. 511-018-2

## CHAPTER II

Preliminary Classification:

Proposed Class:

Subclass:

NOTE: "All applicants are requested to include a preliminary classification on newly filed patent applications. The preliminary classification, preferably class and subclass designations, should be identified in the upper right-hand corner of the letter of transmittal accompanying the application papers, for example 'Proposed Class 2, subclass 129'" M.P.E.P., § 601, 7th ed.

TRANSMITTAL LETTER  
TO THE UNITED STATES ELECTED OFFICE (EO/US)

(ENTRY INTO U.S. NATIONAL PHASE UNDER CHAPTER II)

INTERNATIONAL APPLICATION NO	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/GB00/00721	March 3, 2000	March 5, 1999
TITLE OF INVENTION		
MIXING, AERATION OR OXYGENATING METHOD AND APPARATUS		
APPLICANT(S)		
Kenneth O'HARA		

Box PCT

Assistant Commissioner for Patents  
Washington D.C. 20231

ATTENTION: EO/US

## CERTIFICATION UNDER 37 C.F.R. § 1.10\*

(Express Mail label number is **mandatory**.)

(Express Mail certification is optional.)

I hereby certify that this Transmittal Letter and the papers indicated as being transmitted therewith is being deposited with the United States Postal Service on this date August 31, 2001, in an envelope as "Express Mail Post Office to Addressee" Mailing Label Number EL762542990US, addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231

Judith Schick

(type or print name of person mailing paper)



Signature of person mailing paper

**WARNING:** Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. § 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.

**\*WARNING:** Each paper or fee filed by "Express Mail" must have the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 C.F.R. § 1.10(b).

"Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will not be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 56,439, at 56,442.

**NOTE:** To avoid abandonment of the application, the applicant shall furnish to the USPTO, not later than 20 months from the priority date: (1) a copy of the international application, unless it has been previously communicated by the International Bureau or unless it was originally filed in the USPTO; and (2) the basic national fee (see 37 C.F.R. § 1.492(a)). The 30-month time limit may not be extended. 37 C.F.R. § 1.495

**WARNING:** Where the items are those which can be submitted to complete the entry of the international application into the national phase are subsequent to 30 months from the priority date the application is still considered to be in the international state and if mailing procedures are utilized to obtain a date the express mail procedure of 37 C.F.R. § 1.10 must be used (since international application papers are not covered by an ordinary certificate of mailing—See 37 C.F.R. § 1.8.

**NOTE:** Documents and fees must be clearly identified as a submission to enter the national state under 35 U.S.C. § 371 otherwise the submission will be considered as being made under 35 U.S.C. § 111 37 C.F.R. § 1.494(f)

- i. Applicant herewith submits to the United States Elected Office (EO/US) the following items under 35 U.S.C. § 371:
- ☒ This express request to immediately begin national examination procedures (35 U.S.C. § 371(f)).
  - ☒ The U.S. National Fee (35 U.S.C. § 371(c)(1)) and other fees (37 C.F.R. § 1.492) as indicated below:

## 2. Fees

CLAIMS FEE	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) CALCULATIONS	
<input checked="" type="checkbox"/> *	TOTAL CLAIMS	24 - 20 =	4	× \$18.00 =	\$ 72.00	
	INDEPENDENT CLAIMS	2 - 3 =	0	× \$80.00 =	-0-	
	MULTIPLE DEPENDENT CLAIM(S) (if applicable) + \$270.00					
	BASIC FEE** <input type="checkbox"/> U.S. PTO WAS INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY Where an International preliminary examination fee as set forth in § 1.482 has been paid on the international application to the U.S. PTO: <input type="checkbox"/> and the international preliminary examination report states that the criteria of novelty, inventive step (non-obviousness) and industrial activity, as defined in PCT Article 33(1) to (4) have been satisfied for all the claims presented in the application entering the national stage (37 C.F.R. § 1.492(a)(4)) ..... \$100.00 <input type="checkbox"/> and the above requirements are not met (37 C.F.R. § 1.492(a)(1)) ..... \$690.00 <input checked="" type="checkbox"/> U.S. PTO WAS NOT INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY Where no international preliminary examination fee as set forth in § 1.482 has been paid to the U.S. PTO, and payment of an international search fee as set forth in § 1.445(a)(2) to the U.S. PTO: <input type="checkbox"/> has been paid (37 C.F.R. § 1.492(a)(2)) ..... \$710.00 <input checked="" type="checkbox"/> has not been paid (37 C.F.R. § 1.492(a)(3)) ..... \$1000.00 <input type="checkbox"/> where a search report on the international application has been prepared by the European Patent Office or the Japanese Patent Office (37 C.F.R. § 1.492(a)(5)) ..... \$860.00					
Total of above Calculations					= 1,072.00	
SMALL ENTITY	Reduction by 1/2 for filing by small entity, if applicable. Affidavit must be filed also. (note 37 C.F.R. § 1.9, 1.27, 1.28)					- 536.00
	Subtotal					\$ 536.00
	Total National Fee					\$ 536.00
	Fee for recording the enclosed assignment document \$40.00 (37 C.F.R. § 1.21(h)). (See Item 13 below). See attached "ASSIGNMENT COVER SHEET".					
TOTAL	Total Fees enclosed					\$ 536.00

\*See attached Preliminary Amendment Reducing the Number of Claims.

- ☒ Attached is a ☒ check ☐ money order in the amount of \$ 536.00
- ☐ Authorization is hereby made to charge the amount of \$ \_\_\_\_\_
- ☐ to Deposit Account No. \_\_\_\_\_
- ☐ to Credit card as shown on the attached credit card information authorization form PTO-2038.

**WARNING:** Credit card information should **not** be included on this form as it may become public.

- ☐ Charge any additional fees required by this paper or credit any overpayment in the manner authorized above.

A duplicate of this paper is attached.

**\*\*WARNING:** "To avoid abandonment of the application the applicant shall furnish to the United States Patent and Trademark Office not later than the expiration of 30 months from the priority date: \* \* \* (2) the basic national fee (see § 1.492(a)) The 30-month time limit may not be extended " 37 C.F.R. § 1.495(b)

**WARNING:** If the translation of the international application and/or the oath or declaration have not been submitted by the applicant within thirty (30) months from the priority date, such requirements may be met within a time period set by the Office 37 C.F.R. § 1.495(b)(2) The payment of the surcharge set forth in § 1.492(e) is required as a condition for accepting the oath or declaration later than thirty (30) months after the priority date. The payment of the processing fee set forth in § 1.492(f) is required for acceptance of an English translation later than thirty (30) months after the priority date. Failure to comply with these requirements will result in abandonment of the application. The provisions of § 1.136 apply to the period which is set. Notice of Jan. 3, 1993, 1147 O.G. 29 to 40.

3. ☒ A copy of the International application as filed (35 U.S.C. § 371(c)(2)):

**NOTE:** Section 1.495 (b) was amended to require that the basic national fee and a copy of the international application must be filed with the Office by 30 months from the priority date to avoid abandonment. "The International Bureau normally provides the copy of the international application to the Office in accordance with PCT Article 20. At the same time, the International Bureau notifies applicant of the communication to the Office. In accordance with PCT Rule 47.1, that notice shall be accepted by all designated offices as conclusive evidence that the communication has duly taken place. Thus, if the applicant desires to enter the national stage, the applicant normally need only check to be sure the notice from the International Bureau has been received and then pay the basic national fee by 30 months from the priority date." Notice of Jan. 7, 1993, 1147 O.G. 29 to 40, at 35-36. See item 14c below.

- a. ☐ is transmitted herewith.
- b. ☐ is not required, as the application was filed with the United States Receiving Office.
- c. ☒ has been transmitted
- i. ☒ by the International Bureau.  
Date of mailing of the application (from form PCT/1B/308):  
9/14/2000
- ii. ☐ by applicant on \_\_\_\_\_. (Date)

4. ☒ A translation of the International application into the English language (35 U.S.C. § 371(c)(2)):

- a. ☐ is transmitted herewith.
- b. ☒ is not required as the application was filed in English.
- c. ☐ was previously transmitted by applicant on \_\_\_\_\_. (Date)
- d. ☐ will follow.

5. ☒ Amendments to the claims of the International application under PCT Article 19 (35 U.S.C. § 371(c)(3)):

NOTE: The Notice of January 7, 1993 points out that 37 C.F.R. § 1.495(a) was amended to clarify the existing and continuing practice that PCT Article 19 amendments must be submitted by 30 months from the priority date and this deadline may not be extended. The Notice further advises that: "The failure to do so will not result in loss of the subject matter of the PCT Article 19 amendments. Applicant may submit that subject matter in a preliminary amendment filed under section 1.121. In many cases, filing an amendment under section 1.121 is preferable since grammatical or idiomatic errors may be corrected." 1147 O.G. 29-40, at 36.

- a. ☐ are transmitted herewith.
- b. ☒ have been transmitted
  - i. ☒ by the International Bureau.  
Date of mailing of the amendment (from form PCT/1B/308):  
9/14/2000
  - ii. ☐ by applicant on \_\_\_\_\_. (Date)
- c. ☐ have not been transmitted as
  - i. ☐ applicant chose not to make amendments under PCT Article 19.  
Date of mailing of Search Report (from form PCT/ISA/210.):  
\_\_\_\_\_
  - ii. ☐ the time limit for the submission of amendments has not yet expired.  
The amendments or a statement that amendments have not been made will be transmitted before the expiration of the time limit under PCT Rule 46.1.

6. ☒ A translation of the amendments to the claims under PCT Article 19 (38 U.S.C. § 371(c)(3)):
- a. ☐ is transmitted herewith.
  - b. ☒ is not required as the amendments were made in the English language.
  - c. ☐ has not been transmitted for reasons indicated at point 5(c) above.

7. ☒ A copy of the international examination report (PCT/IPEA/409)
- ☒ is transmitted herewith.
  - ☐ is not required as the application was filed with the United States Receiving Office.

8. ☒ Annex(es) to the international preliminary examination report
- a. ☒ is/are transmitted herewith.
  - b. ☐ is/are not required as the application was filed with the United States Receiving Office.

9. ☒ A translation of the annexes to the international preliminary examination report
- a. ☐ is transmitted herewith.
  - b. ☒ is not required as the annexes are in the English language.

10. ☒ An oath or declaration of the inventor (35 U.S.C. § 371(c)(4)) complying with 35 U.S.C. § 115
- a. ☐ was previously submitted by applicant on \_\_\_\_\_  
Date
- b. ☒ is submitted herewith, and such oath or declaration
- i. ☐ is attached to the application.
- ii. ☒ identifies the application and any amendments under PCT Article 19 that were transmitted as stated in points 3(b) or 3(c) and 5(b); and states that they were reviewed by the inventor as required by 37 C.F.R. § 1.70.
- c. ☐ will follow.

II. Other document(s) or information included:

11. ☒ An International Search Report (PCT/ISA/210) or Declaration under PCT Article 17(2)(a):
- a. ☐ is transmitted herewith.
- b. ☒ has been transmitted by the International Bureau.  
Date of mailing (from form PCT/IB/308): 9/14/2000
- c. ☐ is not required, as the application was searched by the United States International Searching Authority.
- d. ☐ will be transmitted promptly upon request.
- e. ☐ has been submitted by applicant on \_\_\_\_\_  
Date
12. ☒ An Information Disclosure Statement under 37 C.F.R. §§ 1.97 and 1.98:
- a. ☒ is transmitted herewith.  
Also transmitted herewith is/are:
- ☒ Form PTO-1449 (PTO/SB/08A and 08B).
- ☒ Copies of citations listed.
- b. ☐ will be transmitted within THREE MONTHS of the date of submission of requirements under 35 U.S.C. § 371(c).
- c. ☐ was previously submitted by applicant on \_\_\_\_\_  
Date
13. ☐ An assignment document is transmitted herewith for recording.  
A separate ☐ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☐ FORM PTO 1595 is also attached.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

14. ☒ Additional documents:
- a. ☐ Copy of request (PCT/RO/101)
  - b. ☒ International Publication No. WO 00/53534
    - i. ☒ Specification, claims and drawing
    - ii. ☐ Front page only
  - c. ☒ Preliminary amendment (37 C.F.R. § 1.121)
  - d. ☒ Other  
Submission of Proposed Drawing Amendment
15. ☒ The above checked items are being transmitted
- a. ☒ before 30 months from any claimed priority date.
  - b. ☐ after 30 months.
16. ☐ Certain requirements under 35 U.S.C. § 371 were previously submitted by the applicant on \_\_\_\_\_, namely:
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

#### AUTHORIZATION TO CHARGE ADDITIONAL FEES

**WARNING:** Accurately count claims, especially multiple dependant claims, to avoid unexpected high charges if extra claims are authorized.

**NOTE:** "A written request may be submitted in an application that is an authorization to treat any concurrent or future reply, requiring a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. An authorization to charge all required fees, fees under § 1.17, or all required extension of time fees will be treated as a constructive petition for an extension of time in any concurrent or future reply requiring a petition for an extension of time under this paragraph for its timely submission. Submission of the fee set forth in § 1.17(a) will also be treated as a constructive petition for an extension of time in any concurrent reply requiring a petition for an extension of time under this paragraph for its timely submission." 37 C.F.R. § 1.136(a)(3).

**NOTE:** "Amounts of twenty-five dollars or less will not be returned unless specifically requested within a reasonable time, nor will the payer be notified of such amounts, amounts over twenty-five dollars may be returned by check or, if requested, by credit to a deposit account " 37 C.F.R. § 1.26(a).

☒ Please charge, in the manner authorized above, the following additional fees that may be required by this paper and during the entire pendency of this application:

☒ 37 C.F.R. § 1.492(a)(1), (2), (3), and (4) (filing fees)

**WARNING:** Because failure to pay the national fee within 30 months without extension (37 C.F.R. § 1.495(b)(2)) results in abandonment of the application, it would be best to always check the above box

☒ 37 C.F.R. § 1.492(b), (c) and (d) (presentation of extra claims)

NOTE Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 C.F.R. § 1.492(d)), it might be best not to authorize the PTO to charge additional claim fees, except possible when dealing with amendments after final action.

☒ 37 C.F.R. § 1.17 (application processing fees)

☒ 37 C.F.R. § 1.17(a)(1)-(5) (extension fees pursuant to § 1.136(a).

☐ 37 C.F.R. § 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. § 1.311(b))

NOTE Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance 37 C.F.R. § 1.311(b).

NOTE 37 C.F.R. § 1.28(b) requires "Notification of any change in loss of entitlement to small entity status must be filed in the application . . . prior to paying, or at the time of paying . . . issue fee." From the wording of 37 C.F.R. § 1.28(b), (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity

☒ 37 C.F.R. § 1.492(e) and (f) (surcharge fees for filing the declaration and/or filing an English translation of an International Application later than 30 months after the priority date).



SIGNATURE OF PRACTITIONER

K. Bradford Adolphson

Ware, Fressola, Van der Sluys & Adolphson LLP

(type or print name of practitioner)

Bradford Green, Bldg. 5, 755 Main Street

P.O. Address

P.O. Box 224, Monroe, CT 06468

Reg. No.: 30,927

Tel. No.: (203) 261-1234

Customer No.: 004955



Practitioner's Docket No. 511-018-2

PATENT

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Kenneth O'Hara

Application No.: 0 /

Group No.:

Filed: herewith

Examiner:

For: MIXING, AERATION OR OXYGENATING METHOD AND APPARATUS

Assistant Commissioner for Patents  
Washington, D.C. 20231SUBMISSION OF PROPOSED DRAWING AMENDMENT  
FOR APPROVAL BY EXAMINER (37 C.F.R. 1.123)

Attached please find

(check applicable items)

- ☐ a sketch in permanent ink,  
☒ a copy of the original drawing(s) with red ink markings,

showing the proposed changes to the drawing(s) in this application, for which the approval of the Examiner is requested.

Reg. No.: 30,927

## SIGNATURE OF PRACTITIONER

K. Bradford Adolphson

Ware, Fressola, Van der Sluys & Adolphson LLP  
(type or print name of practitioner)

Tel. No.: ( 203 ) 261-1234

Bradford Green, Bldg. 5, 755 Main Street  
P.O. Address

Customer No.: 004955

P.O. Box 224, Monroe, CT 06468

NOTE: 37 C.F.R. § 1.121(a)(3)(ii) indicates that "Where a change to the drawings is desired, a sketch in permanent ink showing proposed changes in red, to become part of the record, must be filed for approval by the examiner and should be in a separate paper."

NOTE: While drawings submitted under §§ 1.81, 1.83-1.85, 1.152, 1.165, 1.174, and 1.437 may not be filed by facsimile, proposed drawing corrections for approval may be submitted by facsimile transmission. Notice of Oct. 15, 1993, 58 Fed. Reg. 54,494-54,504, at 54,495.

## CERTIFICATE OF MAILING/TRANSMISSION (37 C.F.R. 1.8(a))

I hereby certify that this correspondence is, on the date shown below, being:

## MAILING

☐ deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

## FACSIMILE

☐ transmitted by facsimile to the Patent and Trademark Office.

Signature

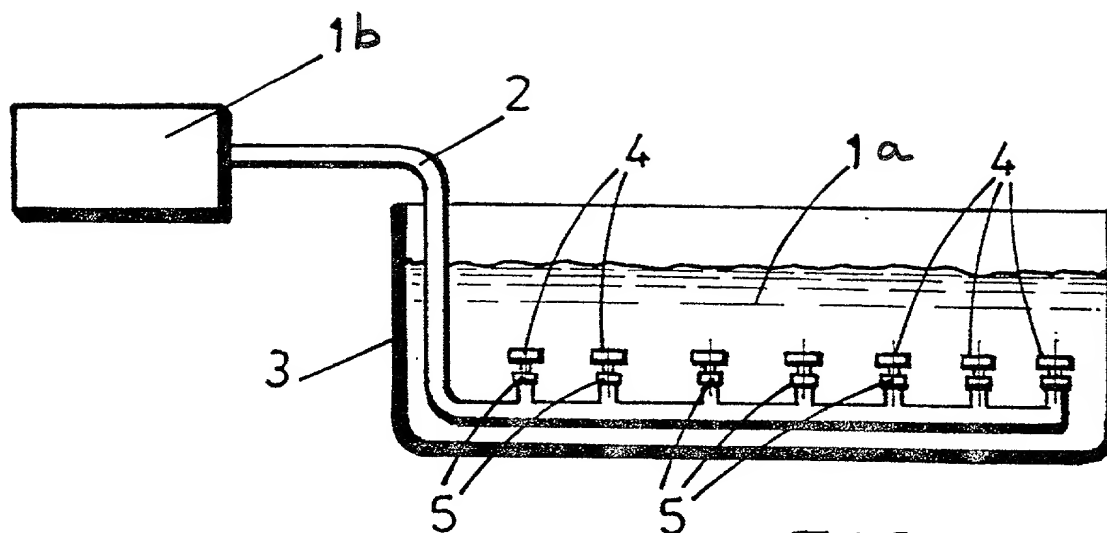
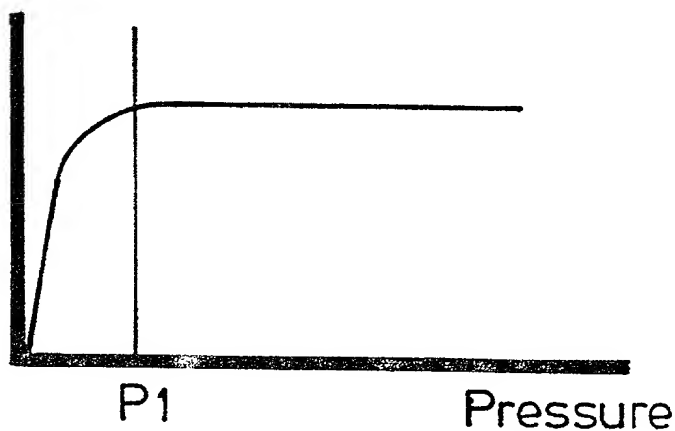


Date: \_\_\_\_\_

(type or print name of person certifying)

(Submission of Proposed Drawing Amendment for Approval by Examiner (37 C.F.R. 1.123) [9-16]—page 1 of 1)

Express Mail No. EL762542990US

1/1FIG. 1Gas FlowFIG. 2

1/pts

Title: Mixing, Aeration or Oxygenating Method and Apparatus

The present invention relates to a method and apparatus for regulating the distribution of gaseous fluids and in particular to a mixing, aerating or oxygenating method and apparatus to aerate or oxygenate ponds, rivers, estuaries, reservoirs or lakes, sewage or effluent treatment lagoons beds or tanks or to airstrip volatile compounds from water or other solutes.

There are many situations where submerged diffusers are used to introduce gas into a liquid. For example to transfer oxygen into a liquid (typically water) for the purposes of aeration and mixing, and especially to oxygenate the water. Such techniques are used in aerobic biological treatments systems as used to treat sewage, effluents of various types, and storm water and water in aquaria or lakes and rivers, among others. They are also used for air stripping of volatile organics from contaminated water.

It is common to treat sewage in "activated sludge treatment plants" by feeding precise volumes of air to a plurality of diffusers which release the air into the water in precise small bubbles to stimulate natural processes. The number of diffusers and hence the spacing is calculated relative to the volume of water to be treated and the amount of treatment required. The diffusers are usually placed at the lowest point in the water column allowing the most time for air to pass through the water prior to reaching the atmosphere.

In the known systems a plurality of diffusers are fed from a supply line, usually from a suitable air source such as an air pump, which delivers a constant and even supply of air. The diffusers are disposed in series along the supply line and the quantity of air emerging from each diffuser is intended to be substantially the same. In the known sewage treatment systems potential pressure drop along the line from one diffuser to the

next is rendered negligible by utilising a supply pipe having a large cross-sectional area and a relatively low-pressure supply. The cross-section of the pipe has to be calculated having regard to the number of diffusers and the discharge rate in order to ensure that there is a negligible pressure drop along the length of the pipe and thereby ensure that the flow from the diffusers is balanced. In other specific aeration systems a manually adjustable valve or orifice control may be provided for each diffuser to balance their output. The known system of individually balanced gas diffusers is difficult to set up to ensure correct balance, usually requiring accurate levelling of the outlet diffusers.

A constant flow regulator and a method of manufacturing same comprising a moving "O" ring is described in Patent Nos. EP 115342 and GB 2136713. The described regulator gives a constant through volume flow rate of liquid over a wide range of supply pressures. A regulator of this type can be designed to produce a specific flow rate over a prescribed pressure range and can be moulded from plastics which makes them extremely economical to produce. When a plurality of such constant flow devices are fitted in series in a pipeline supplied with liquid at a sufficiently high pressure, the flow rate is constant from each regulated line irrespective of the pressure fluctuations along the pipeline(s) of the system. The supply line pressure has to be above a pre-determined minimum level at the point where the pressure drop is highest. Usually this will be at the end of the pipeline. The use of these devices has not been considered to regulate the flow of air or oxygen. There is no teaching to use these devices with fluids other than liquids. The reason for this may be that none of the commercially available devices have been deemed able to operate to produce constant flow with fluctuating air pressure.

It is an aim of the present invention to provide a gas distribution system which overcomes the current difficulties.

One aspect of the invention provides a method of distributing gas through a piped system having a plurality of outlet lines branching from a common supply line or manifold, the method comprising continuously generating a predetermined minimum volume of gas and introducing it into the pipe system, delivering a desired quantity of gas at each of the outlets by providing a constant flow regulator means in each outlet line which limits the flow to a set amount when the pressure in the pipe system exceeds a predetermined minimum value.

More particularly, the present invention provides a method of mixing, aerating or oxygenating ponds, rivers or lakes, sewage/treatment lagoons or effluent beds or air stripping volatile compounds from water or other solutes, the method comprising distributing air or oxygen through a piped system having a plurality of outlet lines branching from a common supply line or manifold, by continuously generating a predetermined minimum volume of air or oxygen and introducing it into the pipe system, delivering a desired quantity of the air or oxygen at each of the outlets by providing a constant flow regulator means in each outlet line which limits the flow to a set amount when the pressure in the pipe system exceeds a predetermined minimum value.

For the aforementioned applications the gas as referred to hereinafter will be air or oxygen.

More particularly the predetermined minimum volume of gas exceeds a calculated minimum volume which is required to be delivered by the diffusers. Preferably a moving element control flow regulator is chosen to achieve this irrespective of pressure drop along the pipe, at least within a pressure range which is deemed acceptable. For most applications an accurate and even quantity of gas is delivered at each outlet. This can be achieved using constant flow regulators having a specific and even flow rating for each outlet.

Another aspect of the present invention provides a gas distribution system comprising a gas distribution supply line, a source of gas pressure connected to the distribution supply line, and a plurality of outlet lines branching from the distribution supply line, and characterised by a constant flow regulator disposed between the distribution supply line and each outlet line to cause a desired flow of gas to be delivered through the outlet lines.

More particularly, the present invention provides a mixing, aeration or oxygenation system to aerate or oxygenate ponds, rivers, estuaries, reservoirs or lakes, sewage or effluent treatment lagoons or beds or to airstrip volatile compounds from water or other solutes and comprising an air or oxygen distribution supply line, a source of air or oxygen pressure connected to the distribution supply line, and a plurality of outlet lines branching from the distribution supply line, and characterised by a constant flow regulator disposed in each outlet line to cause a desired flow of air or oxygen to be delivered through the outlet lines.

For the aforementioned application the gas referred to herewith will be air or oxygen. There may be more than one distribution line.

More particularly a predetermined minimum volume of gas is supplied, which volume is calculated to exceed the minimum volume which is to be delivered from the diffusers. The desired flow of gas is a desired even flow of gas.

The constant flow regulator may be a moving "O" ring constant flow regulator or other moving element constant flow regulator which is precisely tuned to deliver the desired calculated supply of gas required at the outlet line irrespective of changes in supply pressure such that it is self compensating for changes in supply pressure within its designed operating range.

In an alternative, a moving "O" ring regulator is used that only allows a desired maximum flow (volume) of gas to pass through above a known pressure of gas. Using such a regulator, pressure drops along the pipeline can be compensated for by using a regulator which has the desired maximum flow at a lower pressure to reflect the pressure drop. By this means a substantially even flow of gas is achieved from all the outlets. It will be understood that when the term even is used, there will most usually be an acceptable tolerance variation to the desired flow rate.

Each outlet line has a suitable outlet nozzle. They may be aeration nozzles, diffusers or any other suitable nozzle for the intended application. In a preferred application each outlet line supplies a respective diffuser. Conveniently the outlet lines are disposed in series along the distribution supply line. The number of outlet lines and hence outlet nozzles/diffusers are calculated and spaced according to the particular application. Preferably the gas originates from a suitable source, usually generated by a pump gas blower or generator or other suitable device, and preferably it delivers a constant volume of gas. The system can be used for distributing any desired gas composition. For many applications the gas will be air other gases could be oxygen, carbon dioxide, nitrogen or ozone. The distribution supply line comprises at least one length of pipe. As an alternative it may comprise a plurality of lengths of pipe branching from a common manifold or having a direct connection with the supply of gas. The pipeline may include a return line or be of ring main type. The outlet lines may incorporate a backflow regulation device and/or an isolation ball valve. Such devices may incorporate the aforesaid constant flow regulator or be provided as separate devices. The constant flow regulator, any backflow regulation device and any isolation valve may be combined with an outlet diffuser.

The invention can be used for a large number of potential applications, for example the treatment sewage, leachate and agricultural waste water by the introduction of air, air stripping of volatile compounds from water or other solutes, mixing water columns, aerating and mixing of aquaria, ponds, lakes and rivers or tanks containing fish, and in connection with various industrial processes. Where the system is used for the purpose of introducing gas into a liquid or other gas, the backflow prevention device avoids the liquid or gas entering the system should the system enter a state of relative negative pressure. The isolation ball valve allows individual branches to be isolated. The system can be used to control a bubble curtain.

For any given application the delivery rate from the outlet lines will be known and the source of gas will be capable of maintaining a constant supply of no less than the calculated minimum requirement for the system.

The present invention may be used for any of the above mentioned applications and any other applications in which gas, and in particular air or oxygen is to be transferred to a liquid.

The present invention will now be described further hereinafter, by way of example only, with reference to the accompanying drawings; in which: -

Figure 1 shows schematically one embodiment of air distribution system embodying the present invention, and

Figure 2 is a graph of flow rate against pressure for a preferred pressure regulator.

For convenience the present invention is described by way of example in relation to the treatment of water by the injection of air. In one application for waste treatment the water will contain effluent. The water/effluent to be treated is shown at 1 and held within an open well or receiver 3. An air distribution pipeline 2 extends from a source of air 1 which supplies the air under pressure to the pipeline. A motor driven pump (not



illustrated) conveniently serves this purpose. The pipeline 2 has a plurality of outlets 4 disposed along the length thereof at spaced intervals. For the purpose of effluent treatment each outlet is provided with a diffuser which releases the air into the water/effluent in the form of small bubbles. In order to ensure that the flow of air from each diffuser is the same, a regulator 5 is incorporated into the flow line between the pipework 2 and the outlet diffuser 4. The regulator may be part of the diffuser or a separate component. The regulator is designed to deliver a constant flow irrespective of pressure variations in the pipeline when the pressure in the pipeline exceeds a predetermined minimum value, which minimum value is calculated to be that which will ensure that each regulator supplies the desired volume of gas. The preferred regulator device is of a type known as a moving element constant flow regulator such as described in the above mentioned patents. These are very economical to produce, especially when moulded from plastics.

The preferred moving element regulator is designed to operate to deliver a desired flow of air over a range of supply pressures. That is to say it is self-compensating for changes in supply pressure over a prescribed range of pressures above a minimum pressure level. Figure 2 is a graph of a constant pressure regulator of moving element type having characteristics of the described type and shows flow volume against pressure. It shows how the flow rate plateaus after pressure P1. Using a plurality of flow regulators in a distribution supply line will give rise to an even delivery of air from the plurality of diffusers providing the pressure in the pipeline exceeds the minimum threshold value P1.

In an alternative, using an "O" ring type regulator, the regulator only allows a set maximum flow (volume) of air to pass through at a given pressure of air providing the pressure in the system does not exceed that given pressure, then the flow rate from each outlet line will be at the set maximum flow rate, and a regulator is chosen which provides

the desired flow rate for a particular application. This can be used where there is little or no pressure drop along the distribution line.

CLAIMS

1. A method of mixing, aerating or oxygenating ponds, rivers or lakes, sewage/treatment lagoons or effluent beds or air stripping volatile compounds from water or other solutes, the method comprising distributing air or oxygen through a piped system having a plurality of outlet lines branching from a common supply line or manifold, by continuously generating a predetermined minimum volume of air or oxygen and introducing it into the pipe system, delivering a desired quantity of the air or oxygen at each of the outlets by providing a constant flow regulator means in each outlet line which limits the flow to a set amount when the pressure in the pipe system exceeds a predetermined minimum value.
2. A method as claimed in claim 1 in which the minimum volume of air or oxygen exceeds a calculated minimum volume which is required to be delivered from the outlets.
3. A method as claimed in claims 1 or 2 in which substantially the same quantity of air or oxygen is delivered at each outlet irrespective of pressure drop along the pipe, at least within a flow range which is deemed acceptable.
4. A method as claimed in anyone of claims 1 to 3 in which a moving element constant flow regulator is used.
5. A method as claimed in claim 1 in which the pressure is kept substantially constant along the distribution line and an accurate and even quantity of air or oxygen is delivered at each outlet using a moving "O" ring constant flow regulator which operates at its set maximum flow rate to deliver the desired flow at the set pressure.

- ART 34 AMPT
6. A system as claimed in claim 1 in which a predetermined minimum volume of air or oxygen is supplied, which volume is calculated to exceed the minimum volume which is to be delivered from all the outlets from the outlet lines.
  7. A system as claimed in claim 1 in which the desired flow of air or oxygen is a desired even flow of air or oxygen.
  8. A mixing, aeration or oxygenation system to aerate or oxygenate ponds, rivers, or lakes, sewage or effluent treatment lagoons or beds or to airstrip volatile compounds from water or other solutes and comprising an air or oxygen distribution supply line, a source of air or oxygen pressure connected to the distribution supply line, and a plurality of outlet lines branching from the distribution supply line, and characterised by a constant flow regulator disposed in each outlet line to cause a desired flow of air or oxygen to be delivered through the outlet lines.
  9. A system as claimed in claim 8 in which the regulator is tuned to deliver the desired calculated supply of air or oxygen required at the outlet line irrespective of changes in supply pressure such that it is self compensating for changes in supply pressure within its designed operating range.
  10. A system as claimed in claim 8 in which the regulator is designed to only allow a desired maximum flow (volume) of air or oxygen to pass through at a known pressure of air or oxygen.
  11. A system as claimed in claim 10 in which the constant flow regulator comprises an "O" ring moving element ring constant flow regulator.
  12. A system as claimed in anyone of claims 8 to 11 in which each outlet line has a suitable outlet nozzle.

ART 34 AMDT

13. A system as claimed in claims 8 to 12 in which the outlet lines are disposed in series along the distribution line.
14. A system as claimed in anyone of claims 8 to 13 in which the source of air or oxygen pressure is a pump which delivers a constant volume of air or oxygen.
15. A system as claimed in anyone of claims 8 to 14 in which the distribution supply line comprises at least one length of pipe.
16. A system as claimed in anyone of claims 8 to 15 in which the distribution supply line comprises a plurality of lengths of pipe branching from a common manifold or having a direct connection with the supply of air or oxygen.
17. A system as claimed in anyone of claims 8 to 16 in which the pipeline includes a return line or is of ring main type.
18. A system as claimed in anyone of claims 8 to 17 in which the outlet lines incorporate a backflow regulation device and/or an isolation ball valve.
19. A method of aerating or oxygenating ponds, rivers or lakes, sewage/treatment lagoons or effluent beds or air stripping volatile compounds from water or other solutes, by distributing air or oxygen through a piped system when constructed and arranged substantially as hereinbefore described with reference to the accompanying drawings.
20. A mixing, aeration or oxygenation system to aerate or oxygenate ponds, rivers, or lakes, sewage or effluent treatment lagoons or beds or to airstrip volatile compounds from water or other solutes constructed and arranged substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

1/1

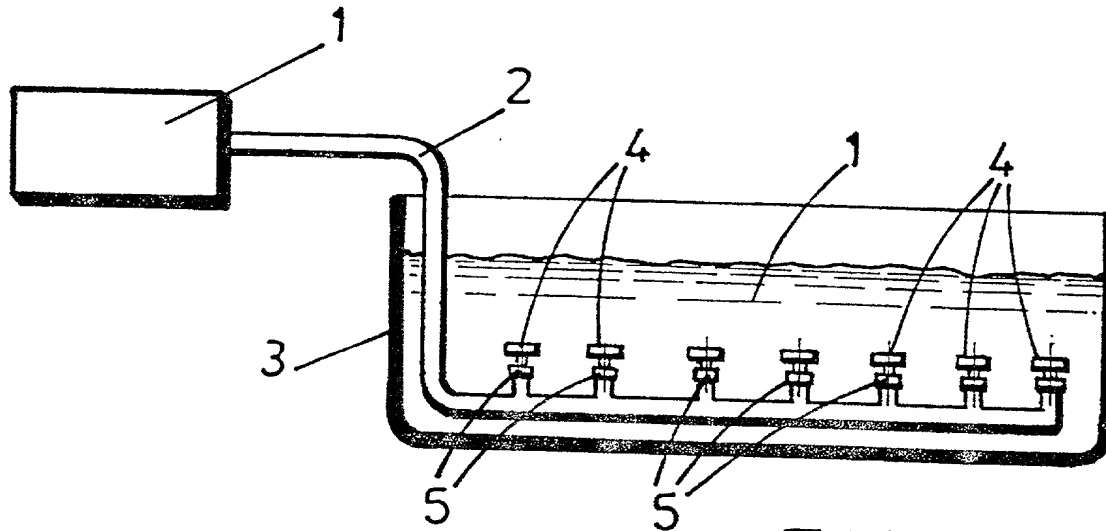


FIG. 1

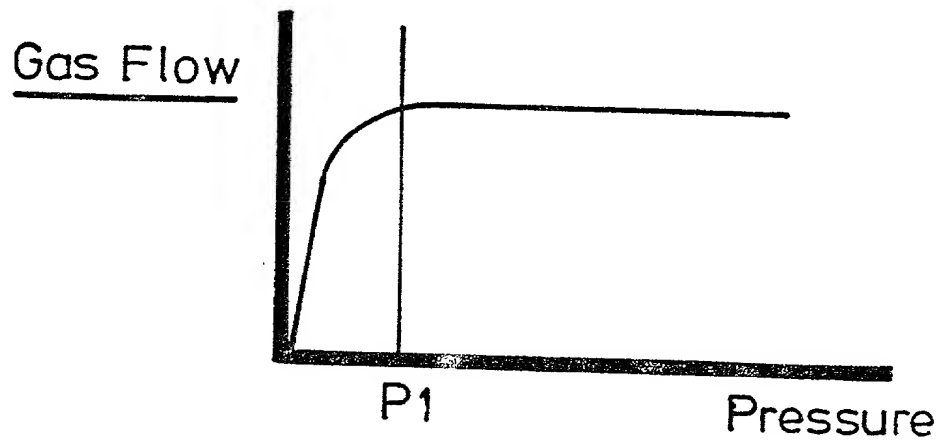


FIG. 2

---

**COMBINED DECLARATION AND POWER OF ATTORNEY**

(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL,  
CONTINUATION, OR C-I-P)

---

As a below named inventor, I hereby declare that:

**TYPE OF DECLARATION**

This declaration is of the following type:

*(check one applicable item below)*

☐ original.

☐ design.

*NOTE: With the exception of a supplemental oath or declaration submitted in a reissue, a supplemental oath or declaration is not treated as an amendment under 37 CFR 1.312 (Amendments after allowance). M.P.E.P. § 714.16, 7th Edition.*

☐ supplemental.

*NOTE: If the declaration is for an International Application being filed as a divisional, continuation or continuation-in-part application, do not check next item; check appropriate one of last three items.*

☒ national stage of PCT.

*NOTE: If one of the following 3 items apply, then complete and also attach ADDED PAGES FOR DIVISIONAL, CONTINUATION OR C-I-P.*

*NOTE: See 37 C.F.R. § 1.63(d) (continued prosecution application) for use of a prior nonprovisional application declaration in the continuation or divisional application being filed on behalf of the same or fewer of the inventors named in the prior application.*

☐ divisional.

☐ continuation.

*NOTE: Where an application discloses and claims subject matter not disclosed in the prior application, or a continuation or divisional application names an inventor not named in the prior application, a continuation-in-part application must be filed under 37 C.F.R. § 1.53(b) (application filing requirements — nonprovisional application).*

☐ continuation-in-part (C-I-P).

**INVENTORSHIP IDENTIFICATION**

**WARNING:** *If the inventors are each not the inventors of all the claims, an explanation of the facts, including the ownership of all the claims at the time the last claimed invention was made, should be submitted.*

My residence, post office address and citizenship are as stated below, next to my name. I believe that I am the original, first and sole inventor (*if only one name is listed below*) or an original, first and joint inventor (*if plural names are listed below*) of the subject matter that is claimed, and for which a patent is sought on the invention entitled:

**TITLE OF INVENTION**

MIXING, AERATION OR OXYGENATING METHOD AND APPARATUS

---

## SPECIFICATION IDENTIFICATION

the specification of which:

(complete (a), (b), or (c))

(a) ☐ is attached hereto.

NOTE: "The following combinations of information supplied in an oath or declaration filed on the application filing date with a specification are acceptable as minimums for identifying a specification and compliance with any one of the items below will be accepted as complying with the identification requirement of 37 CFR 1.63:

"(1) name of inventor(s), and reference to an attached specification which is both attached to the oath or declaration at the time of execution and submitted with the oath or declaration on filing;

"(2) name of inventor(s), and attorney docket number which was on the specification as filed;  
or

"(3) name of inventor(s), and title which was on the specification as filed."

Notice of July 13, 1995 (1177 O.G. 60).

(b) ☐ was filed on \_\_\_\_\_, as ☐ Serial No. 0 / \_\_\_\_\_  
or ☐ \_\_\_\_\_  
and was amended on \_\_\_\_\_ (if applicable).

NOTE: Amendments filed after the original papers are deposited with the PTO that contain new matter are not accorded a filing date by being referred to in the declaration. Accordingly, the amendments involved are those filed with the application papers or, in the case of a supplemental declaration, are those amendments claiming matter not encompassed in the original statement of invention or claims. See 37 C.F.R. § 1.67.

NOTE: "The following combinations of information supplied in an oath or declaration filed after the filing date are acceptable as minimums for identifying a specification and compliance with any one of the items below will be accepted as complying with the identification requirement of 37 CFR 1.63:

"(A) application number (consisting of the series code and the serial number, e.g., 08/123,456);

"(B) serial number and filing date;

"(C) attorney docket number which was on the specification as filed;

"(D) title which was on the specification as filed and reference to an attached specification which is both attached to the oath or declaration at the time of execution and submitted with the oath or declaration; or

"(E) title which was on the specification as filed and accompanied by a cover letter accurately identifying the application for which it was intended by either the application number (consisting of the series code and the serial number, e.g., 08/123,456), or serial number and filing date. Absent any statement(s) to the contrary, it will be presumed that the application filed in the PTO is the application which the inventor(s) executed by signing the oath or declaration."

M.P.E.P. § 601.01(a), 7th Ed.

(c) ☒ was described and claimed in PCT International Application No. PCT/GB00/00721, filed on March 3, 2000 and as amended under PCT Article 19 on March 9, 2001 (if any).



## SUPPLEMENTAL DECLARATION (37 C.F.R. § 1.67(b))

(complete the following where a supplemental declaration is being submitted)

- ☐ I hereby declare that the subject matter of the
- ☐ attached amendment
  - ☐ amendment filed on \_\_\_\_\_

was part of my/our invention and was invented before the filing date of the original application, above-identified, for such invention.

### ACKNOWLEDGEMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information, which is material to patentability as defined in 37, Code of Federal Regulations, § 1.56,

(also check the following items, if desired)

- ☐ and which is material to the examination of this application, namely, information where there is a substantial likelihood that a reasonable Examiner would consider it important in deciding whether to allow the application to issue as a patent, and
- ☐ in compliance with this duty, there is attached an information disclosure statement, in accordance with 37 C.F.R. § 1.98.

### PRIORITY CLAIM (35 U.S.C. §§ 119(a)-(d))

NOTE: "The claim to priority need be in no special form and may be made by the attorney or agent if the foreign application is referred to in the oath or declaration as required by § 1.63. The claim for priority and the certified copy of the foreign application specified in 35 U.S.C. 119(b) must be filed in the case of an interference (§ 1.630), when necessary to overcome the date of a reference relied upon by the examiner, when specifically required by the examiner, and in all other situations, before the patent is granted. If the claim for priority or the certified copy of the foreign application is filed after the date the issue fee is paid, it must be accompanied by a petition requesting entry and by the fee set forth in § 1.17(i). If the certified copy is not in the English language, a translation need not be filed except in the case of interference; or when necessary to overcome the date of a reference relied upon by the examiner; or when specifically required by the examiner, in which event an English language translation must be filed together with a statement that the translation of the certified copy is accurate." 37 C.F.R. § 1.55(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §§ 119(a)-(d) of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

(complete (d) or (e))

- (d) ☐ no such applications have been filed.
- (e) ☒ such applications have been filed as follows.

NOTE: Where item (c) is entered above and the International Application which designated the U.S. itself claimed priority check item (e), enter the details below and make the priority claim.

**PRIOR FOREIGN/PCT APPLICATION(S) FILED WITHIN 12 MONTHS  
(6 MONTHS FOR DESIGN) PRIOR TO THIS APPLICATION  
AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. § 119(a)-(d)**

COUNTRY (OR INDICATE IF PCT)	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 37 USC 119
Great Britain	9904946.2	5 March 1999	<input checked="" type="checkbox"/> YES    NO <input type="checkbox"/>
			<input type="checkbox"/> YES    NO <input type="checkbox"/>
			<input type="checkbox"/> YES    NO <input type="checkbox"/>
			<input type="checkbox"/> YES    NO <input type="checkbox"/>
			<input type="checkbox"/> YES    NO <input type="checkbox"/>

**CLAIM FOR BENEFIT OF PRIOR U.S. PROVISIONAL APPLICATION(S)**  
(34 U.S.C. § 119(e))

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below:

**PROVISIONAL APPLICATION NUMBER**

**FILING DATE**

\_\_\_\_\_/\_\_\_\_\_  
\_\_\_\_\_/\_\_\_\_\_  
\_\_\_\_\_/\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**CLAIM FOR BENEFIT OF EARLIER US/PCT APPLICATION(S)**  
**UNDER 35 U.S.C. § 120**

- ☐ The claim for the benefit of any such applications are set forth in the attached ADDED PAGES TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR CONTINUATION-IN PART (C-I-P) APPLICATION.

**ALL FOREIGN APPLICATION(S), IF ANY, FILED MORE THAN 12 MONTHS  
(6 MONTHS FOR DESIGN) PRIOR TO THIS U.S. APPLICATION**

NOTE: If the application filed more than 12 months from the filing date of this application is a PCT filing forming the basis for this application entering the United States as (1) the national stage, or (2) a continuation, divisional, or continuation-in-part, then also complete **ADDED PAGES TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR C-I-P APPLICATION** for benefit of the prior U.S. or PCT application(s) under 35 U.S.C. § 120.

**POWER OF ATTORNEY**

I hereby appoint the following practitioner(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

*(list name and registration number)*

*(check the following item, if applicable)*

- ☒ I hereby appoint the practitioner(s) associated with the Customer Number provided below to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.
- ☒ Attached, as part of this declaration and power of attorney, is the authorization of the above-named practitioner(s) to accept and follow instructions from my representative(s).

NOTE: "Special care should be taken in continuation or divisional applications to ensure that any change of correspondence address in a prior application is reflected in the continuation or divisional application. For example, where a copy of the oath or declaration from the prior application is submitted for a continuation or divisional application filed under 37 CFR 1.53(b) and the copy of the oath or declaration from the prior application designates an old correspondence address, the Office may not recognize, in the continuation or divisional application, the change of correspondence address made during the prosecution of the prior application. Applicant is required to identify the change of correspondence address in the continuation or divisional application to ensure that communications from the Office are mailed to the current correspondence address. 37 CFR 1.63(d)(4)." § 601.03, M.P.E.P., 7th Edition.

SEND CORRESPONDENCE TO  
K. Bradford Adolphson

☒ Address  
Ware, Fressola, Van der Sluys &  
Adolphson/LLP  
755 Main Street, P.O. Box 224  
Monroe, CT 06468

☒ Customer Number 004955

DIRECT TELEPHONE CALLS TO:  
*(Name and telephone number)*

K. Bradford Adolphson  
(203) 261-1234

*(complete the following if applicable)*

Since this filing is a ☐ continuation ☐ divisional there is attached hereto a Change of Correspondence Address so that there will be no question as to where the PTO should direct all correspondence.

## DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

## SIGNATURE(S)

NOTE: Carefully indicate the family (or last) name, as it should appear on the filing receipt and all other documents.

NOTE: Each inventor must be identified by full name, including the family name, and at least one given name without abbreviation together with any other given name or initial, and by his/her residence, post office address and country of citizenship. 37 CFR § 1.63(a)(3).

NOTE: Inventors may execute separate declarations/oaths provided each declaration/oath sets forth all the inventors. Section 1.63(a)(3) requires that a declaration/oath, *inter alia*, identify each inventor and prohibits the execution of separate declarations/oaths which each sets forth only the name of the executing inventor. 62 Fed. Reg. 53,131, 53,142, October 10, 1997.

### Full name of sole or first inventor

Kenneth

(GIVEN NAME)

(MIDDLE INITIAL OR NAME)

O'Hara

FAMILY (OR LAST NAME)

Inventor's signature

Date 23/08/01

Country of Citizenship

Great Britain

Residence

Flintshire, Great Britain

Post Office Address

Pen-yr-allt Farm House, Lake Road, Padeswood

Mold, Flintshire, Great Britain CH7 4H7

### Full name of second joint inventor, if any

(GIVEN NAME)

(MIDDLE INITIAL OR NAME)

FAMILY (OR LAST NAME)

Inventor's signature

Date

Country of Citizenship

Residence

Post Office Address

### Full name of third joint inventor, if any

(GIVEN NAME)

(MIDDLE INITIAL OR NAME)

FAMILY (OR LAST NAME)

Inventor's signature

Date

Country of Citizenship

Residence

Post Office Address

(check proper box(es) for any of the following added page(s)  
that form a part of this declaration)

- ☐ **Signature** for fourth and subsequent joint inventors. *Number of pages added* \_\_\_\_\_

\* \* \*

- ☐ **Signature** by administrator(trix), executor(trix) or legal representative for deceased or incapacitated inventor. *Number of pages added* \_\_\_\_\_

\* \* \*

- ☐ **Signature** for inventor who refuses to sign or cannot be reached by person authorized under 37 CFR 1.47. *Number of pages added* \_\_\_\_\_

\* \* \*

- ☐ Added page for **signature** by one joint inventor on behalf of deceased inventor(s) where legal representative cannot be appointed in time. (37 CFR 1.47)

\* \* \*

- ☐ Added pages to combined declaration and power of attorney for divisional, continuation, or continuation-in-part (C-I-P) application.

☐ Number of pages added \_\_\_\_\_

\* \* \*

- ☒ Authorization of practitioner(s) to accept and follow instructions from representative.

\* \* \*

(if no further pages form a part of this Declaration,  
then end this Declaration with this page and check the following item)

- ☐ This declaration ends with this page.

Practitioner's Docket No. 511-018-2

**PATENT**

**ADDED PAGE TO COMBINED DECLARATION AND POWER OF  
ATTORNEY FOR AUTHORIZATION OF ATTORNEY(S) TO ACCEPT AND  
FOLLOW INSTRUCTIONS FROM REPRESENTATIVE**

The undersigned to this declaration and power of practitioner hereby authorizes the U.S. practitioner(s) named herein to accept and follow instructions from

ROYSTONS

Name(s) of authorized representative(s)

Tower Building, Water Street

Address

Liverpool, United Kingdom L3 1BA

as to any actions to be taken in the Patent and Trademark Office regarding this application without direct communication between the U.S. practitioner(s) and the undersigned. In the event of a change in the person(s) from whom instructions may be taken, the U.S. practitioner(s) will be so notified by the undersigned.

Practitioner's Docket No. 511-018-2

**PATENT**

☒ Applicant Kenneth O'Hara ☐ Patentee \_\_\_\_\_  
☐ Application No. ☐ Patent No. \_\_\_\_\_  
☐ Filed on ☐ Issued on \_\_\_\_\_  
Title: MIXING, AERATION OR OXYGENATING METHOD AND APPARATUS

**STATEMENT OF STATUS AS SMALL ENTITY  
(37 C.F.R. § 1.27(a)(1))—INDEPENDENT INVENTOR**

As a below named inventor, I hereby state that I qualify as an independent inventor, as defined in 37 C.F.R. § 1.27(a)(1), for purposes of paying reduced fees to the United States Patent and Trademark Office under Sections 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office, with regard to the invention described in

- ☒ the specification filed herewith, with title as listed above.  
☐ the application identified above.  
☐ the patent identified above.

I have not assigned, granted, conveyed or licensed, and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who would not qualify as a person under 37 C.F.R. § 1.27(a)(1), if that person had made the invention, or to any concern that would not qualify as a small business concern under 37 C.F.R. § 1.27(a)(2), or a nonprofit organization under 37 C.F.R. § 1.27(a)(3).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

- ☒ No such person, concern, or organization exists.  
☐ Each such person, concern or organization is listed below. \*

*\*NOTE: Separate statements should be obtained from each named person, concern or organization having rights to the invention as to their status as small entities.*

FULL NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

FULL NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

FULL NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

(Small Entity—Independent Inventor [7-1]—page 1 of 2)


Express Mail No. EL762542990US

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 C.F.R. § 1.28(g)(2))

NOTE: "The presentation to the Office (whether by signing, filing, submitting, or later advocating) of any paper by a party, whether a practitioner or non-practitioner, constitutes a certification under § 10.18(b) of this chapter. Violations of § 10.18(b)(2) of this chapter by a party, whether a practitioner or non-practitioner, may result in the imposition of sanctions under § 10.18(c) of this chapter. Any practitioner violating § 10.18(b) may also be subject to disciplinary action. See §§ 10.18(d) and 10.23(c)(15)." 37 C.F.R. § 1.4(d)(2).

Kenneth O'Hara

Name of inventor



Signature of Inventor

Date 23 | 08 | 01

Name of inventor

Date

Signature of Inventor

Name of inventor

Date

Signature of Inventor